

Right atrial thrombus and its causes, complications, and therapy

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A 70-year-old man who presented with dyspnea and intermittent chest pain was found to have a large free-floating right atrial thrombus on two-dimensional echocardiogram. Atriotomy was performed, and an 18-cm-long thrombus was removed from the right atrium and inferior vena cava. Postoperatively, the patient developed cardiogenic shock treated by intravenous vasopressor agents and extracorporeal membrane oxygenation. The postoperative course was also complicated by bilateral pulmonary emboli requiring pulmonary artery thrombectomy. Right atrial thrombus is an underdiagnosed condition with a high mortality rate. The best management modality has not yet been established.

The incidence of thrombi of the right atrium (RA) is not well defined (1). Intracardiac thrombi are found in about 10% of cases of pulmonary thromboembolism (PTE). We herein present a case of a patient with a large RA thrombus, likely a thrombus in transit, with subsequent pulmonary emboli who died from cardiogenic shock following surgical intervention.

CASE DESCRIPTION

A 70-year-old black man with prior systemic hypertension, inferior wall myocardial infarction, compensated systolic heart failure, and stage III chronic kidney disease presented to the emergency department with complaints of worsening dyspnea and intermittent pleuritic chest pain. An electrocardiogram done in the emergency department showed sinus tachycardia with large S waves in lead I, large Q waves in lead III, and inverted T waves in lead III (S1Q3T3) and

right bundle branch block. A two-dimensional echocardiogram (Figure 1) showed a large free-floating thrombus in the right

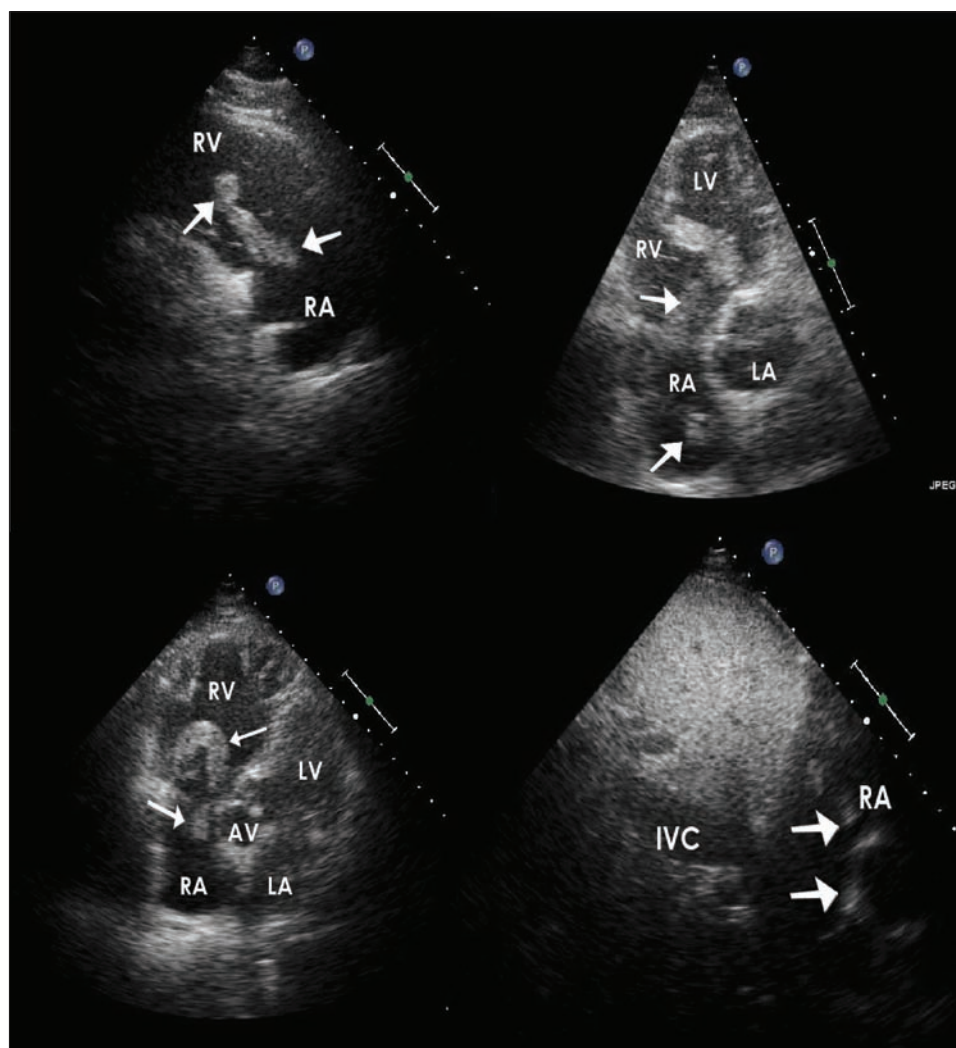


Figure 1. Transthoracic echocardiography showing the right atrial thrombus (arrows) extending into the right ventricle: (a) parasternal long axis view; (b) apical four-chamber view; (c) five-chamber view; and (d) subcostal inferior vena cava view. AV indicates aortic valve; IVC, inferior vena cava; LA, left atrium; LV, left ventricle; RA, right atrium; RV, right ventricle.

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Figure 2. Right atrial thrombus.

atrium protruding into the right ventricle. The right and left ventricular functions were markedly depressed, with akinetic left ventricular inferior wall. The patient was started on a heparin drip and transferred to our institution. He was hemodynamically stable at presentation.

Based on the size of the free-floating RA thrombus, RA thrombectomy was done. An 18-cm-long thrombus was removed from the right atrium and inferior vena cava (*Figure 2*). The total time on cardiopulmonary bypass was around 39 minutes. Immediately after surgery, the patient became markedly hypotensive, requiring intravenous vasopressor agents, intraaortic balloon pump placement, and venoarterial extracorporeal membrane oxygenation. The patient also developed oliguric acute renal failure requiring continuous veno-venous hemodialysis. Seventy-two hours postoperatively, the pulmonary artery pressure was increased. Transesophageal echocardiogram showed a new nonobstructive echo density in the right main pulmonary artery. Computed tomography (CT) pulmonary angiography demonstrated large bilateral pulmonary emboli (*Figure 3*). The patient was taken again to the operative room and underwent successful bilateral thrombectomy with subsequent reduction of his pulmonary artery pressure. However, he remained in cardiogenic shock, requiring intense inotropic and vasopressor support and extracorporeal membrane oxygenation. In view of his poor clinical condition and prognosis, the family decided to withdraw organ support measures and the patient died. An autopsy was not performed.

DISCUSSION

The differential diagnosis of RA masses includes benign or malignant primary or metastatic tumors, tricuspid valve vegetations, and thrombi. Sometimes, RA thrombi are in transit,

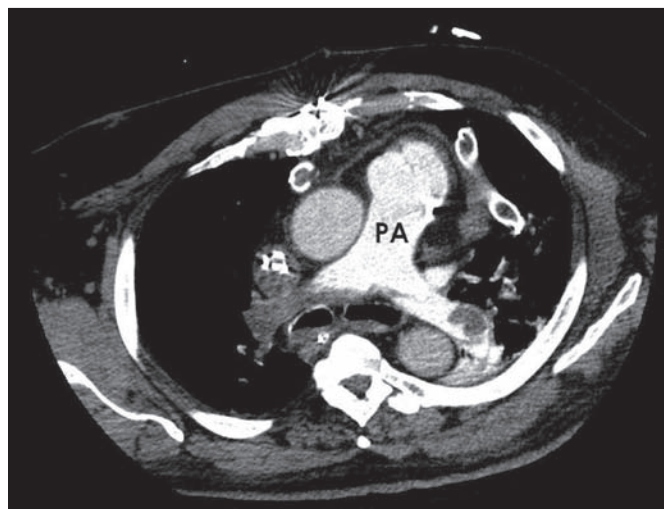


Figure 3. CT pulmonary angiography showing bilateral pulmonary emboli (arrows). PA indicates pulmonary artery.

having migrated from the venous system to the heart; this is likely the case with the large tubular thrombus we describe in this case.

The actual incidence of RA masses is unknown and the condition is likely underdiagnosed, since only symptomatic patients are referred for workup (1). A review from Sweden reported a prevalence of RA thrombi of 7% in 23,796 autopsies, similar to the prevalence of left cardiac thrombi (2). The shallow anatomy of the RA appendage makes it a less likely site for thrombus formation in patients in atrial fibrillation; those with RA appendage thrombi tend to have a larger RA area and lower RA appendage emptying velocities than patients without thrombi (3, 4). Patients with mechanical valves, right-sided pacemaker leads, ventricular or atrial septal closure devices, and indwelling central venous lines are also at higher risk for RA thrombi (5, 6). RA thrombus has been described in about 10% of patients with PTE. Of patients with RA thrombi, 36% had pulmonary emboli and 6.5% of all patients with PTE confirmed at autopsy had RA thrombi (2).

RA thrombi are most commonly diagnosed with transthoracic echocardiography. However, in a study of 16 patients with RA thrombi, size, mobility, and site of attachment of thrombus were better defined by transesophageal echocardiography than by transthoracic echocardiography (7). Patients with proven or suspected RA thrombus are usually treated with anticoagulants, thrombolytic agents, or surgical thrombectomy, depending on thrombus morphology and risk of PTE (8–11).

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